

## Abstract

The project was aimed at evaluating some cultural practices to contain the environmental impact of floriculture industry by means of the reduction of utilization of plastic materials and the use of agricultural by-products as component of root substrates. The trials were carried out at the Agricultural Experimental Farm of the University of Padova (Legnaro, PD) and, for it, also at the Horticultural Experimental Center “Po di Tramontana” (Rosolina, RO). The trials were also carried out in other two farms both located in the Province of Treviso: Soc. Agricola Ballan Guido e Giuliano S.S. e Azienda Agricola l’Orto di Nonno Giorgio. The species considered were cyclamen, poinsettia and geranium. On these species, the LCA analysis (*Life Cycle Assessment*) was also performed in order to obtain the environmental cost of both traditional and innovative cropping system.

A new biodegradable (compostable) container, made of rice hulls, was compared to the plastic traditional one. Rice hulls, by-products of the rice industry, were also evaluate as partial substitute of peat in the substrate manufacturing. Peatlands, in fact, are ecosystems which has to be preserved and the increasing law restrictions led to an increase of cost together with a reduction of its quality so that alternative materials are very desirable. Because of that, other than rice hulls, also anaerobic digested residues of fruit and wine distillery stillages wastes (ADR) were evaluated. ADR have low C/N ratio and high nutrient content, thus they probably have interesting applications in agriculture as organic fertilizers, changing from a by-product which has to be disposed to a suitable resource. Based on the objectives of the FloSo project, the results concerning the numerous experiments on the substrates and on the containers can be summarized as follow.

The perlite, material that is usually added to peat in order to increase air-filled porosity, can be substituted by rice hulls without any depletion of plant growth or quality. Often, the percentage of rice hulls in the substrate can be increased up to 30% without a sensible reduction of plant quality is observed. The negative effect of rice hulls percentages higher that 30% are probably due to the noteworthy increase of total and air-filled porosity and decrease of water holding capacity. The addition of a 20% of ADR increased plant growth of some species and farms. In other occasions the addition resulted in a clear plant growth reduction, probably because of an important increase of substrate salinity.

The utilization of rice hulls container had little effect on the values of the different plant traits collected at the end of the experiments, in particular on growth of the above ground plant organs.

However, in some experiences an increase growth of root system was observed while, in other, root growth decreased.

At the end of the project, we can state that rice hulls container can replace the traditional one in plastic as the differences observed in plant growth and quality were very little and often hardly detectable by the consumers. Concerning the substrates, plant responses varied among species and farms, even if it appeared clearly that percentages of rice hulls of 50% or higher are not advisable. Also the plant response to ADR varied among species and farms but, often influence of this material was little and did not substantially affect the several evaluated parameters. It has to be noted that, in the worst of cases i.e. 50 (or 60)% of rice hulls and, sometimes, with 20% of ADR, plants were just smaller and none of them showed toxicity symptoms so that all plants were marketable.

What emerged from the LCA analysis is that the greenhouse heating is one of the most important environmental cost in relation to global impact (24% in poinsettia and 20% in geranium). Cultivation input has also a high incidence, ranging from 30% (poinsettia) to 15% (cyclamen and geranium). The use of plastic container also increase significantly the global impact, even when the more optimistic scenario is considered. The results of the analysis carried out so far indicate a significant improvement (i.e. reduction) of the environmental cost of all the situations in which rice hulls container is used. However, nowadays the utilization of these containers has both economic and environmental negative implications as the places of production are far from Europe. Even if the adoption of a rice hulls percentages equal or higher that 50% (as a substitute for peat in the manufacturing of substrates) results in a reduction of the global impact, as previously highlighted, its adoption appears not realistic as the production was markedly negatively affected. Utilization of 10 or 30% of rice hulls are more realistic, from the productive point of view, and significantly reduces the global impact so that this cultural practice should be adopted by floriculture industry.